

Table of Contents



National Aeronautics and Space Administration

Introduction

- PBMA Overview
- KM Architecture
- KM Theory
- Guiding Principles
- Program Structure

Present Activities / Capabilities

- What is PBMA-KMS Today?
- Knowledge Base: Video Nuggets
- Knowledge Base: Best Practices Library
- SMA Knowledge Base: Program Profiles Library
- Knowledge Base: System Failure Case Studies Library
- Knowledge Base: Compliance Verification Tool Kit
- Data Systems: Knowledge Registry
- External Content: Lessons Learned
- Collaboration Tools: PBMA Work Groups & CoPs
- Collaboration Tools: Outreach and Agency Awareness
- Collaboration Tools: Secure Meeting

Evolution, Growth and Impact

- Evolution of PBMA
- Agency Compliance
- Metrics and Key Indicators

- Agency-wide impact of CoPs
- Supporting the NASA Safety Center (NSC)
- NSC Communication Initiatives

Future Activities

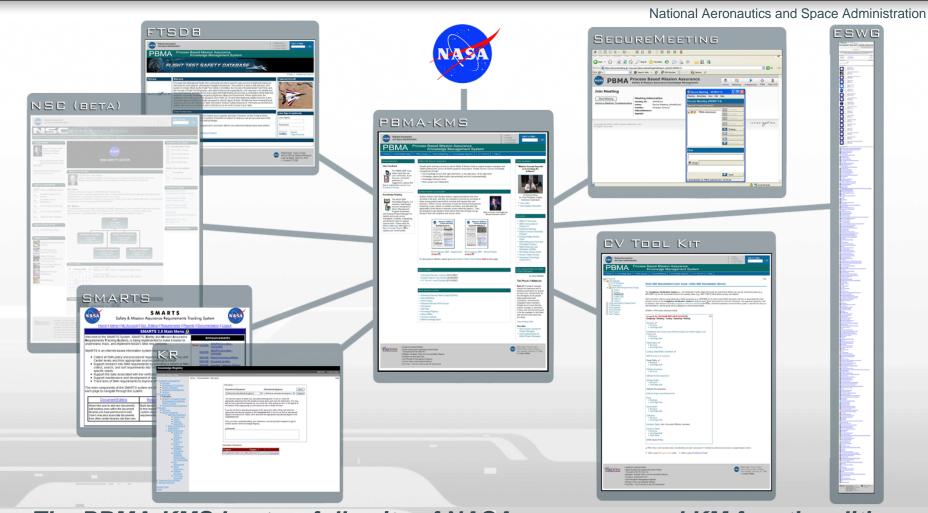
- Rely on the Grassroots (Viral), but not exclusively
- Multiple Knowledge Architecture Interfaces
- Meta Tagging / Semantics / Visualization
- Don't Underestimate Programmatic Overhead
- Support and User Interactions
- Embrace Change
- Don't Let Inmates Run the Asylum
- Don't Fall in Love with Products
- Marketing Get the Word Out
- Competition or Partner?

Conclusion

Guiding Principles

PBMA Overview





The PBMA-KMS hosts a full suite of NASA resources and KM functionalities supporting missions, programs, and projects across the Agency

KM Architecture



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- Initial development began in 1998
- Operationally deployed in March of 2001
 - -1st fully-operational Agency-wide Knowledge Management System
- Supports Program Management, Engineering, and SMA communities

-Fully integrates SMA functions into traditional systems engineering program/project

lifecycle

Project Phase Elements		Formulation		Implementation				
	1.0 Program Management	2.0 Concept Development	3.0 Acquisition	4.0 Hardware Design	5.0 Software Design	6.0 Manufacturing	7.0 Pre-Ops Int & Test	8.0 Operations
0.2 Planning -Defining and Organizing the Things We Need To Do	1.2 - Program Plans - S&MA Plan - Risk Mgmt Plan - Program Safety - QA Plan - Config Mgmt Plan	2.2 - Life Cycle Req's Planning - Long Lead Compliance	3.2 - Develop SOW - Acq Strategy Plan - Contractor Surveilance Plan	4.2 - Concurrent Eng Plan - System Spec - Design Req Mgmt Plan - Material & Parts Plan	5.2 - Software Dev Mgmt Plan	6.2 - Work Review Plans - Supply Chain Mgmt Plan - Trans Handling and Storage Plan - Contam Control	7.2 - Develop Integ & Test Req's - Pre-Ops Int & Test Plan	8.2 - Fit Safety Assur Planning - Range Safety - Gmd Ops Safety - Ops FMEA - Emergency Prep - Contigency Plan
0.3 Processes -Doing the Things We Need To Do	1.3 - Resource Mgmt - Schedule Mgmt - Doc and Data Mgmt System	2.3 Req's Analysis Functional Analysis & Aloc Pert Metrics WBS Verif Concept	3.3 - Develop Acq. Instruments - Acq. Lessons Learned	4.3 - Implement Adv Quality - Design-for-X - Human Factors - Tools & Techniques	5.3 - Software FMEA - Human Factors - Tools & Techniques	6.3 - Implement Adv Quality	7.3 - Flight H/W & S/W Intergrated Testing - Conduct Demo, Inspections - SMA Verification Activities - Working Groups	8.3 - Environ Impact Assessment - Safety & Risk Trend Analysis - Real-Time Ops Support
0.4 Program Control -Checks and Balances	1.4 - Implement Config - Mgmt - Milestone Review - Implement Msn Success Plans - Employ IA	2.4 - Concept Dev Reviews - Risk Assess Reviews - Science Theme Conformance	3.4 - Implement R-BAM - Train Source Eval Board - Due Diligence - Tools and Techniques	4.4 - Sys Safety Hazard Analysis - Design Verif Processes - Employ IA	5.4 - Process Maturity (CMM) - S/W Safety and Hazard Analysis - Milestone Rev's - Design Verif - Employ IA	6.4 - Change Control - Process Capab - Work Control - Processes - Material Review - Board - Employ IA	Pre-Ops Int & Test inherent	8.4 - Ops readiness Reviews - IA of Ops Readiness
0.5 Verification and Testing	Program Team Capabilities Cost/Resource Balance Pgm Reserves and Margins		3.5 n implicit in rocesses	4.5 - Verif. Plan - Conduct Analysis, Demonstration, Similarity, Inspection, Modeling & Sim	5.5 - S/W Verification Test Plan - Formal Methods -Conduct Testing	6.5 - Verification Plan - Conduct Test, Demonstration	control & verif functions	8.5 Verification implicit in contro process

KM Theory



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- PBMA-KMS was tactically implemented with a focus on the practical application of KM theory: a systems engineering management approach and a continual improvement/risk management philosophy
 - Knowledge Management Theory
 - Focus on People and Processes
 - Practical view of new technology as an enabler, not a driver
 - Systems Engineering (SE)
 - Multiple stakeholder involvement (up-front and across life-cycle)
 - Safety & Mission Assurance community
 - Program/Project Managers
 - Agency IT Security
 - Information Assurance/Security
 - ITAR/Export Control Managers
 - Human Resource Managers
 - Traditional SE approach for implementing IT HW/SW infrastructure
 - Risk Management
 - Continual Improvement (through CRM)
 - Demonstrated Return on Investment (ROI)
 - Metrics (qualitative and quantitative)

Program Structure



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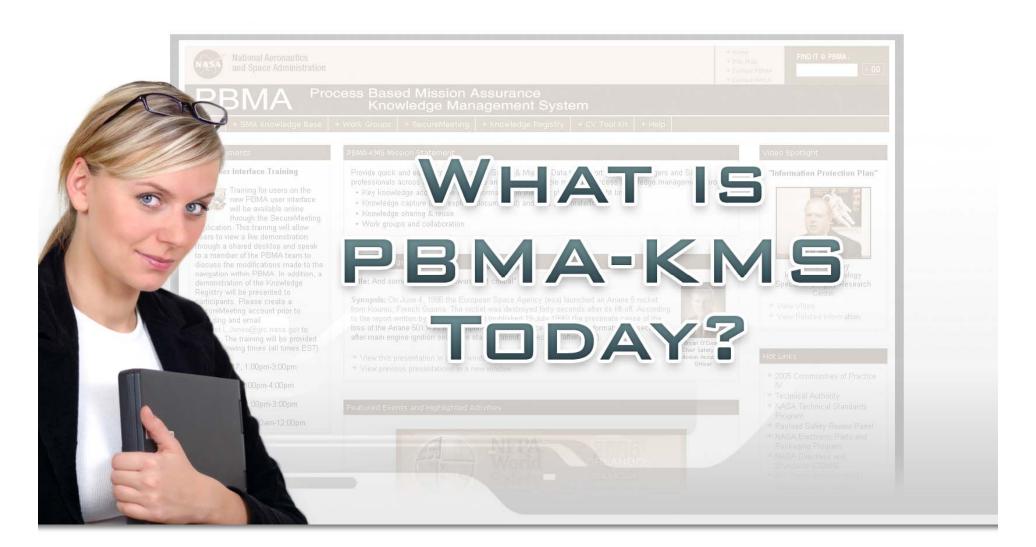
- Office of Safety and Mission Assurance (OSMA)
 - Bryan O'Connor, Chief, Safety and Mission Assurance, is the Headquarters Executive Sponsor of PBMA
 - Stephen Wander serves as Program Champion from NASA HQ, and provides oversight and program direction
- Managed by the PBMA-KMS Implementation Manager
 - Suzanne Otero, GRC
- Contract for PBMA support held by ARES Corporation



Present Activities / Capabilities



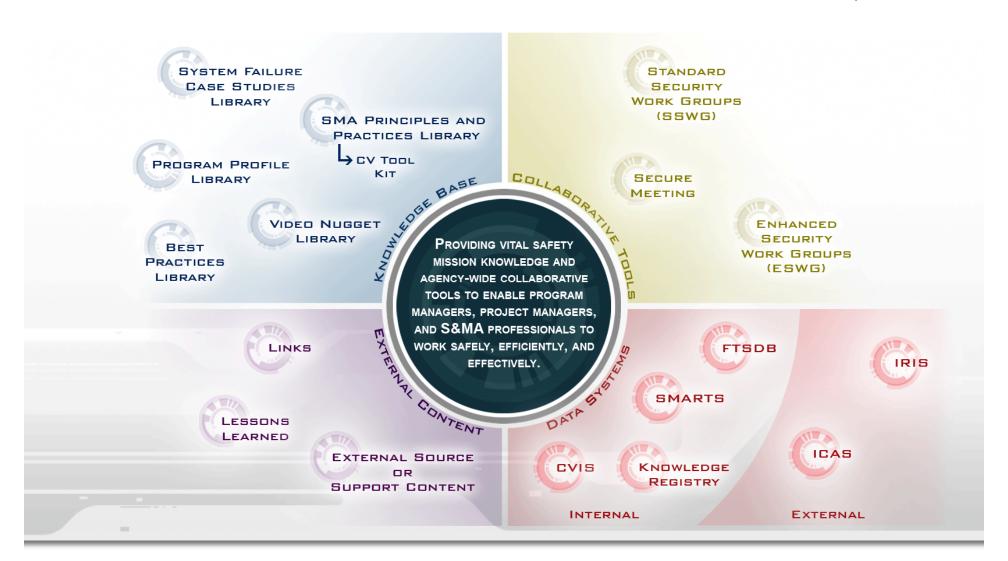
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What is PBMA-KMS Today?



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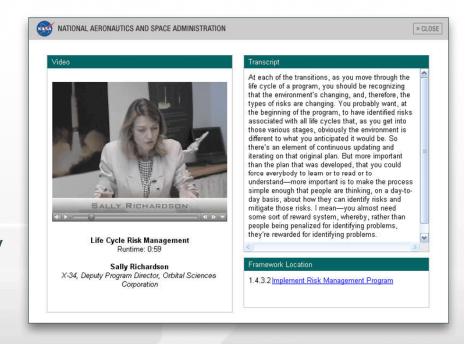


Knowledge Base: Video Nugget Library



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- Video Nuggets bring the PBMA content to life by capturing the reality and the passion of the experts
 - Provides context to work processes
 - Learning from stories
 - Provides enhanced interaction and utility for the users, and also supplement and complement the PBMA-KMS text.
 - The Video Library provides direct
 access to the full suite of web-ready
 video interviews, and enables
 PBMA users to find specific video
 nuggets by speaker, title, and
 framework sections.



Knowledge Base: Best Practices Library



DHB-S-002

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Transitioning NASA-center knowledge to NASA-wide knowledge

 Each year Best Practices in assurance planning are solicited from the Center Directors, these include safety plans, risk plans, quality plans, etc.

Proven program documents that Project Managers,
 Facility Managers, Developers, etc. can build upon and tailor for their projects

- Library contains plans, processes, procedure documents, handbooks, manuals, tools and techniques
- Diverse scope ranges from overall high level documents such as systems safety plans to lower level documents addressing fastener integrity

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Knowledge Base: Program Profiles Library

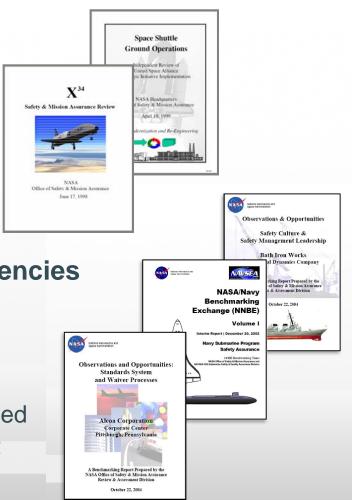


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- Independent Assessment Reports for selected NASA programs and projects
 - Selected reviews of Program/Project implementation of SMA functionality conducted by HQ OSMA
 - PBMA Framework used as basis for analysis

 Benchmarking with other government agencies and private sector peers

- Learning from the successes and failures of ourselves and others
- Identifying Best Practices and Lessons Learned that can be applied to the NASA environment
- Gap Analysis and Action Plan Development



Knowledge Base: System Failure Case Studies Library



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Addresses engineering failures that have occurred in the past

- Concise summaries include the historical background, underlying issues, details on problem resolution, and ultimately the applicability of the failure to everyday issues within the Agency
- Intended to promote an exchange of ideas among project personnel to examine and improve their own practices



Knowledge Base: Compliance Verification Tool Kit



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Compliance Verification (CV) Tool Kit

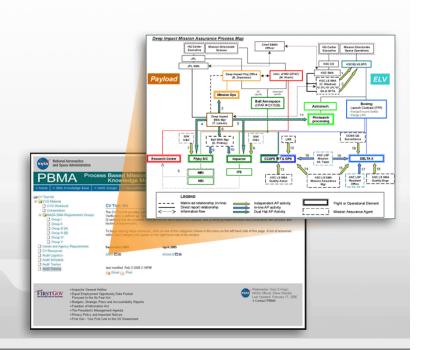
- CV material compliments the official NASA Policy Directives and Procedural Requirements (NPD/NPR) located in the NASA Online Directives Information System (NODIS)
- Prepares users for future SMA compliance verification audits

CV Training Modules

- OSMA Audit Process Overviews (PA&R, IFO, IPS)
- On-site Auditor & Audit Lead Training
- SMA Process Analysis: "How To" Guide (under development)

SMA Process Analysis (Maps & Matrices)

- Provides graphical and narrative representation and tracking of the SMA roles, responsibilities, and relationships within a given program/project
- Used by program/project management to help identify gaps in the SMA requirements



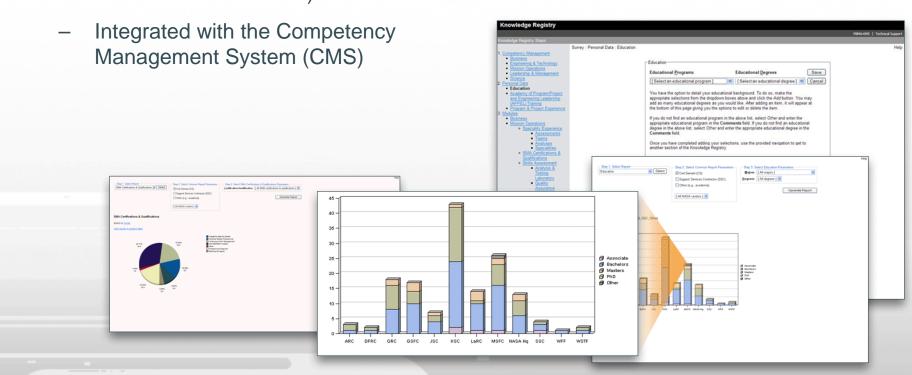
Data Systems: Knowledge Registry



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Access-to-Agency Experts

 Provides a fully searchable database of critical skills across the Agency (civil servant and contractor)



External Content: Lessons Learned



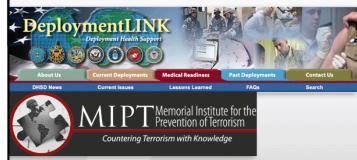
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- Enables retention and dissemination of corporate knowledge
- Links to selected Lessons Learned data bases
 - NASA Lessons Learned Information System
 - JSC Lessons Learned Data Base

Army Lessons Learned

- DOE Lessons Learned Information Services
- Center for Army Lessons Learned Virtual Research Library
- Other worldwide sites





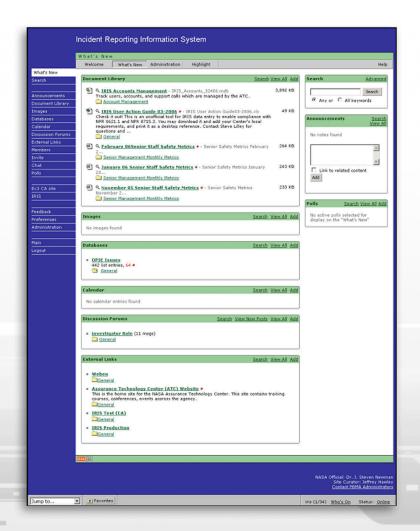
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ENERGY

Collaboration Tools: PBMA Work Groups & CoPs



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Technical Overview:

- Secure
 - 128-bit encryption
 - Authorized to store SBU data
- Tools
 - Document Library
 - Media Library
 - Database
 - Calendar
 - Polling
 - Threaded Discussions
 - Real-time Chat
 - Mailing Lists
 - Action Tracking
- Functions
 - Single-Sign-On
 - Full-Text Search
 - Version Control
 - Check-In/Check-Out
 - Relational Databases
 - Hierarchical Calendars
 - Layered Security Model
 - Customizable Communities
 - RSS Subscriptions

Collaboration Tools: Outreach & Agency Awareness



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The Communities of Practice Workshop is an open forum for discussion on the use of the PBMA tools and an opportunity to provide feedback to the PBMA Management Team

On behalf of the NESS group I would like to thank you for allowing us to attend your PBMA Workshop. I know that I learned a lot that I had not known about PBMA.

I was also impressed with the thought that went into the structuring of PBMA in particular your matrix of mission phases vs. program elements. I had been thinking of something along these lines related to phasing of OSMA tasking into the systems engineering process phasing as suggested by the NASA Systems Engineering Handbook and similar DOD material. It seems to me that this phasing and emphasis of OSMA tasks during various phases is something that has not received enough emphasis in the recent past perhaps because the bulk of the NASA effort and the OSMA focus was on existing or late stage designs.

Your people certainly have gotten me, for one, thinking.

Thanks again for your kindness and hospitality. *Joe (Fragola)*

COP I

- September 11-12, 2001
- Washington, DC
- 22 participants
- Educated the PBMA team on the concept of Communities of Practice and to developed a method of mapping Communities of Practice throughout all of NASA

COP II

- Date: June 4-5, 2002
- Location: Falls Church, VA
- 31 participants
- This workshop will help us maintain momentum and build on success; identify what we're doing right and where we can do better; and explore and identify alternative pathways.

COP III

- November 18-19, 2003
- Newport News, VA
- 48 participants
- Demonstrations of the new and advanced functions as well as discussions on work group security.
- Guidance on working with ITAR/EAR data and an overview of a new feature for sending secure information will also be presented.

COP IV

- November 2005
- Las Vegas, NV
- 68 participants
- The Communities of Practice workshop was an open forum for discussion on the use of the PBMA tools and an opportunity to provide feedback to the PBMA Management Team.
- Demonstrations on new functionality in sharing secure information via work groups and online meetings to support remote work and large, dispersed work groups more efficiently were provided.

The CoP Workshops are a powerful mechanism to share new ideas and start discussions that might otherwise never occur

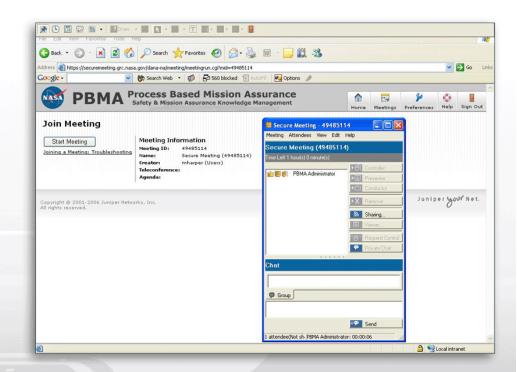
Collaborative Tools: Secure Meeting



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Real-time Online Remote Meeting and Conferencing Capability

- 128-bit encryption
- Authorized to process SBU data
- Ability to share presentations between multiple users and pass control of the meeting among attendees
- Ability to see and demonstrate applications and files without the need to have similar software on attendees PCs (ex. advanced CAD and modeling simulators can be viewed by all attendees regardless of if they own the software)
- Ability to save transcripts and whiteboard within the presentation
- Built-in meeting scheduling and user invitation



Evolution, Growth and Impact



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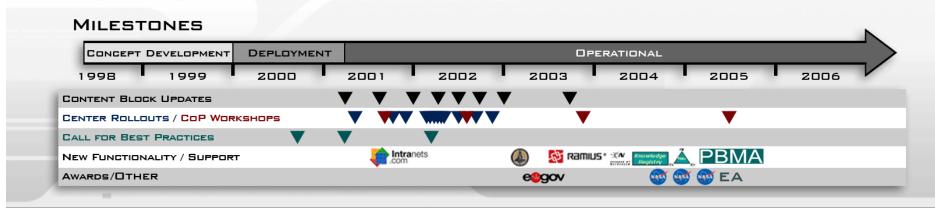
Evolution of PBMA



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Milestones

- PBMA concept development performed 1998 through 1999
- Deployed in April of 2000, PBMA is the first fully operational NASA-wide multi-functional Knowledge Management System. Call for Best Practices began in mid-2000
- PBMA Standard Security Work Groups (SSWG) deployed in October of 2000
- Fully Operational in March of 2001
- Center Rollouts and Communities of Practice Workshops began in 2001
- PBMA Enhanced Security Work Groups (ESWG) deployed in April of 2004
- PBMA Knowledge Registry deployed in May of 2004
- PBMA Secure Meeting deployed in August of 2004
- Enterprise Architecture certification in April of 2005
- PBMA redesigned into NASA Portal affinity August of 2005



Agency Compliance



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IT Security

- PBMA has involved IT Security in all aspects of design and planning for the functional elements of the PBMA-KMS and PBMA-ESWG
- Utilized 3rd party penetration testing on HIGH category systems

Currently in process for the new 2810 Certification & Accreditation (June 2007)

Enterprise Architecture

- The first Knowledge Management system to go through the Enterprise Architecture process
- Passed EA certification in April 2005



Metrics and Key Indicators



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Key Metrics of the Knowledge Management System

- Over 210 Best Practices from 10 NASA locations
- 28 Lessons Learned resource links
- 315 Video Nuggets from 108 individuals
- Over 500 links to various Program/Project Management and SMA resources
- Over 6 Million hits during FY06

Key Metrics of the Enhanced Security Work Groups

- 100% System uptime
- There are currently 565 Work Groups.
- There are currently **9429** users.
- There have been 3760 new users added during calendar year 2006 (1118 in the first 3 months of 2007).

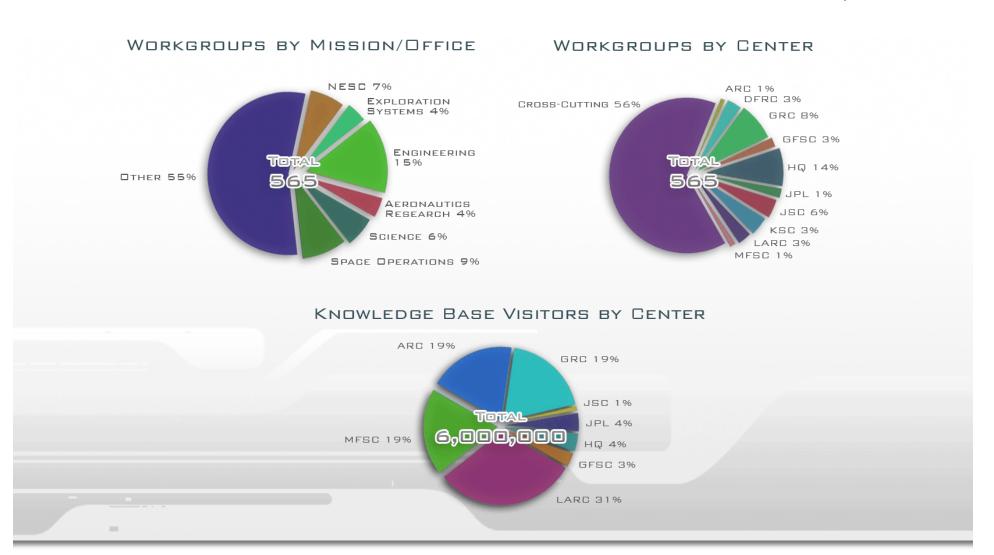
Key Metrics of Secure Meeting

- 1714 total users since inception
- Undergoing a major growth surge with 629 user accounts created since the beginning of the 2007 calendar year.

Agency-wide Impact of CoPs



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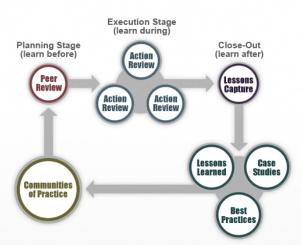


Supporting the NASA Safety Center (NSC)



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- Facilitating Human Interaction / Organizational Learning Aspects of KM
 - Interfacing with institutional and program/project-level efforts to ensure the continuation of the SMA Corporate Memory (e.g., facilitated Pause and Learn, After Action Reviews, Peer Assists)





- Integrate the various activities in the NSC as a cross-cutting support function
 - PBMA is the conduit for information flow for the NSC
 - Enhances the ability for SMA to present
 Engineering and Program/Project Managers
 with focused, efficient and effective guidance

NSC Communication Initiatives



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- Use data in the various PBMA-KMS systems to target specific groups within the Agency.
 - Capability to issue targeted:
 - Agency Safety Alerts
 - Mishap Investigation Report lessons learned
 - Monthly newsletters
 - Notices of training events
 - Notices on conferences
- Distribution of Products:
 - "Tail Gate Safety Meeting" packages
 - Video Nuggets
 - Targeted case studies
 - Monthly System Failure Case Studies
 - NSC weekly Safety Briefs



Future Activities



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Rely on the Grassroots (Viral), but not exclusively



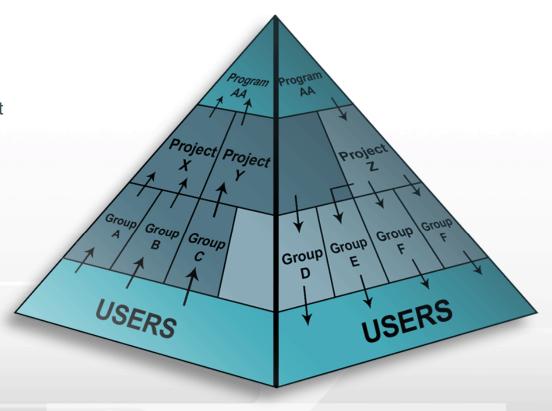
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Bottom-up

- Good
 - User supported
 - Quick to react to user needs
- Bad
 - Lack of management support
 - No program funding
 - Fragmented approach
 - No defined policy

Top-down

- Good
 - Management support
 - Unified approach
 - Funding
 - Defined policy
- Bad
 - Mandate
 - Slow to react
 - Potential user resistance



PBMA - A BALANCE OF BOTH

Multiple Knowledge Architecture Interfaces



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EXISTING

Project Phase Elements	Formulation			Implementation					
	1.0 Program Management	2.0 Concept Development	3.0 Acquisition	4.0 Hardware Design	5.0 Software Design	6.0 Manufacturing	7.0 Pre-Ops Int & Test	8.0 Operations	
									0.1 Policies -Rules and Guidelines We Need To Follow
0.2 Planning -Defining and Organizing the Things We Need To Do	1.2 - Program Plans - S&MA Plan - Risk Mgmt Plan - Risk Mgmt Plan - Rogram Safety - QA Plan - Config Mgmt Plan	2.2 - Life Cycle Req's Planning - Long Lead Compliance	3.2 - Develop SOW - Acq Strategy Plan - Contractor Surveilance Plan	4.2 - Concurrent Eng. Plan - System Spec - Design Req. Mgmt Plan - Material & Plans. Plan	5.2 - Software Dev Mgmt Plan	6.2 - Work Review Plans - Supply Chain Mignt Plan - Trans Handling and Storage Plan - Contain Control	7-2 - Develop Integ & Test Rieg's - Pre-Ope Int & Test Plan	6.2 - Fit Safety Assur Planning - Range Safety - Gmd Ops Safety - Ops FMEA - Emergency Prep - Contigency Plan	
0.3 Processes -Doing the Things We Need To Do	1.3 - Resource Mgmt - Schedule Mgmt - Doc and Data Mgmt System	2.3 - Reg's Analysis - Functional - Analysis & Aloc - Part Metrics - WBS - Verif Concept	3.3 - Develop Acq. Instruments - Acq. Lessons Learned	4.3 - Implement Adv Quality - Design-for X - Human Factors - Tools & Techniques	5.3 - Software FMEA - Human Factors - Tools & Techniques	6.3 - Implement Adv Quality	7.3 - Fight H/W & S/W Interpreted Testing - Conduct Demo, Inspections - SMA Verification Activities - Working Groups	8.3 - Environ Impact Assessment - Safley & Rosk Trend Analysis - Real-Time Ops Support	
0.4 Program Control -Checks and Balances	1.4 - Implement Config - Mignt - Milestone Review - Implement Man Success Plans - Employ IA	2.4 - Concept Dev Reviews - Risk Assess Reviews - Science Theme Conformance	3.4 Implement R-BAM Train Source Eval Board Oue Diligence Tools and Techniques	4.4 - Sys Safety Hazard Analysis - Design Verif Processes - Employ IA	5.4 - Process Maturity (CMM) - S/W Safety and Hazard Analysis - Misestone Rev's - Design Venif - Emptoy IA	6.4 - Change Control - Process Capub - Vilox Control Processes - Material Review Board - Employ IA	Pre-Ops Int & Test	6.4 - Ops readiness Reviews - IA of Ops Readiness	
0.5 Verification and Testing	1.5 - Program Team Capabilities - Cost Resource Balance - Pigm Reserves and Margins	2.5 Verification	3.5 n implicit in processes	4.5 - Varif, Plan - Conduct Analysis, Demonstration, Similarity, Inspection, Modeling & Sim	Employ IA 5.5 - SIV Verification Test Plan Formal Methods -Conduct Testing	Employ IA 5.5 Varification Plan Conduct Test, Demonstration	7.5 inherent — control & verif functions	8.5 Verification implicit in contro process	

Adding multiple frameworks to provide greater utility to multiple community

- Data organized by:
 - Engineering discipline
 - System/subsystem element (e.g., for SSP, Constellation, etc.)
 - Science and/or mission focus
 - Program/project milestone gate
- Business Unit Architecture
 - Customizable web portals
 - Users can effectively re-shuffle the deck and have information delivered in a format tailored to their needs

PROPOSED

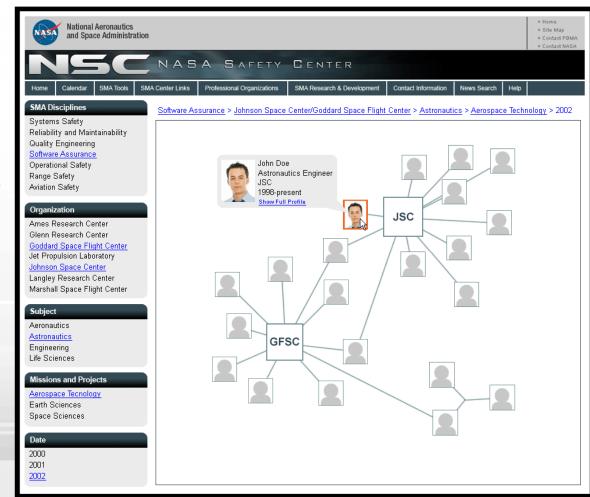


Meta Tagging / Semantics / Visualization



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- Incorporate new approaches to deliver richer views into existing content
- Structured approach to tagging data
 - Utilize existing information categorization efforts (NASA taxonomy, NEXIOM, PBMA) to fully describe data
 - Effective for content inside the PBMA-KMS system
- Implement a Semantic Search capability
 - "Concept Aware" navigation
 - Mixture of inferencing and relationship identification
- Visualize and deliver
 - Variations on social and neural networks
 - Find connections and deeper meaning



Don't Underestimate Programmatic Overhead



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Compliance costs can be prohibitive

- Federal and Agency compliance is unforgiving on budgets
- Unfunded mandates are the norm.

Shifting top-level (ex. Mission) priorities can be challenging

- Regular changes in priorities can cause instability and confusion in the user base
- Funding priorities can shift rapidly
- Strategic planning is difficult

Support and User Interaction is Key



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 KM systems do not survive without a heavy dose of the human element.

- Help Desk and user interaction is critical to the success of the system
- Over deliver on technical support and all interactions with the user base.
 Users will judge the system by the people behind it.
- All KM systems will have shortcomings –
 it is the way those shortcomings are
 dealt with that will determine the
 success of the overall effort.

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31

Embrace Change



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Strategically react to the environment

- Challenging to do in a tight budgetary environment
- Changes must either integrate with the existing roadmap, or they should trigger a reevaluation of the existing direction



Change for the sake of change is usually bad

- Don't implement the latest "widget" without a solid business case
- Use the user community as peer reviewers on concepts *prior* to going into prototyping – you might be surprised at what you *don't* need to change.

Don't Let the Inmates Run the Asylum



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Programmers should not be driving the KM system

 Just because the product is delivered via we-based technologies, doesn't mean that that the programmers should be defining program direction.

Subject Matter Experts should be driving the system

- Users will want to know if they can trust the content of your KMS. Make your SME's a critical part of the product development and delivery.
- Promote the SME's to the user community and allow them to interact–facilitate this interaction.

Don't Fall in Love with Products



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Don't buy the tool, buy what it does

- Don't get complacent with a vendor, continue to make the "build vs. buy" analysis as the system grows.
- Licensing can become prohibitive as the system grows.
- Don't let success be your undoing (success can kill the budget if proper planning isn't in place).

Marketing - Get the Word Out



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 To both users and your customer (in our case NASA Management).

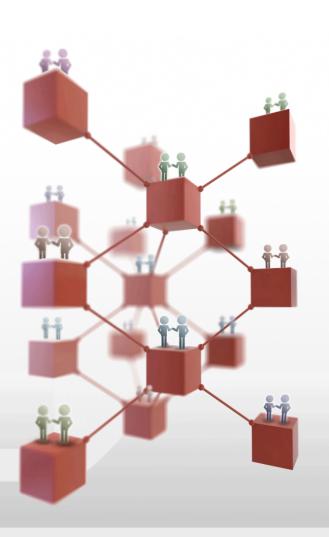
 Crucial to keeping management knowledgeable on the importance of your system. If the facts don't speak to the importance of your system then you are doing something wrong.

Competition or Partner?



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- Work to avoid duplicative efforts.
- Share resources, knowledge, lessons learned and best practices, and keep communication open.
- Today's technologies like Web Services and Semantic Tech can interface with other systems to make the sum greater then the parts.





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CONCLUSION

Guiding principles



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- "Mind the Knitting" Focus on core Agency safety & mission success objectives
- "Steer for the Curve Ahead" PBMA's strategic philosophy
 - "AS-IS" vs. "TO-BE" future-state analysis: anticipation of evolving government and Agency Enterprise Architecture requirements (e.g., security and integration) and evolving technology
 - Resource planning and management
- "Listen to the Work Process" Bring value based on feedback
 - Real time feedback from individual users via the PBMA-KMS web site
 - Improved efficiencies, content, and functionality
- "Strive for Excellence" Managing the PBMA-KMS program
 - Feasible, sustainable, and configuration-managed plans
 - Documented, capable, and stable processes
 - Secure, compliant, and achievable Enterprise Architecture practices
- "Integrate Best of the Best" Implementation of COTS products
 - Continually evaluate the "Make vs. Buy" proposition / tradeoff
 - Quarterly technology analyses conducted to anticipate evolutions in KM COTS functionality
 - Monthly engagement with academic and industry KM professionals and professional societies
- "Manage with Metrics"
 - Perform qualitative and quantitative analyses
 - Continuously demonstrate ROI